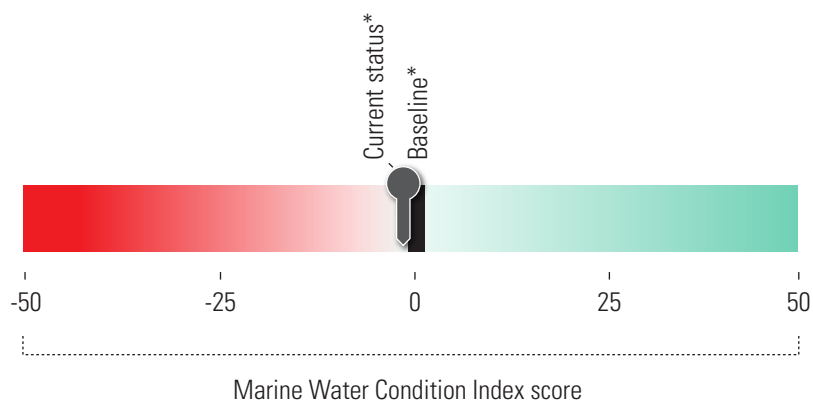


# Marine Water Quality

## Marine Water Condition Index

### Progress Toward the 2020 Target

The Leadership Council has not adopted a specific target for the Marine Water Condition Index.



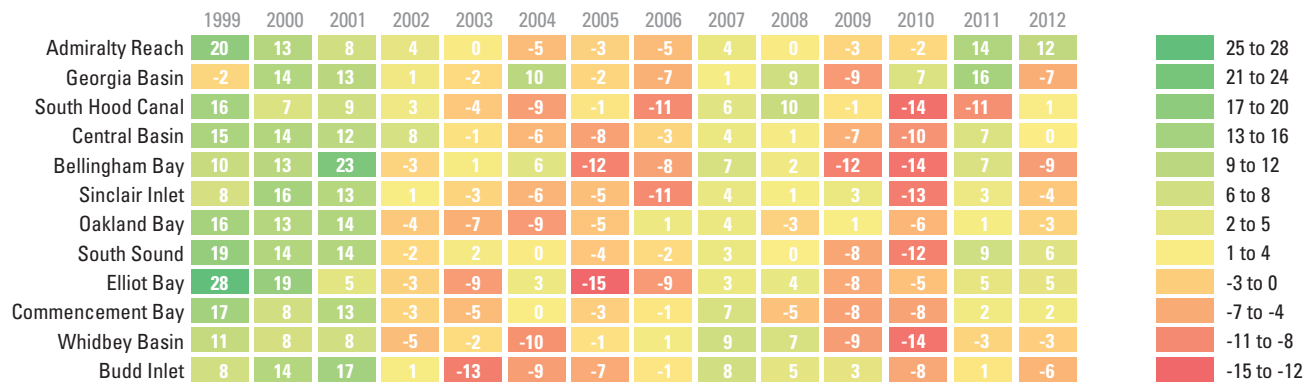
\* The baseline, set at zero, is established for the period 1999 to 2008. The status shows the average score in 2012.

### Is Water Quality Improving?

Marine water quality was slightly lower in Puget Sound in 2012 relative to the 10-year, 1999-2008 baseline. However, looking more closely at water quality region by region, there was quite a bit of variability in 2012. Conditions were much better in some regions relative to the baseline (e.g., Admiralty Reach, South Sound, and Elliott Bay). In other regions, conditions got worse (e.g., Bellingham Bay, Georgia Basin, and Budd Inlet). Conditions were at an all time low over much of Puget Sound in 2010, and improved somewhat temporarily in 2011.

Marine Water Condition Index scores have generally declined over the past 14 years, illustrated by a shift from green to red colors and an increase in negative scores. These results indicate that conditions overall are shifting in the direction of lower water quality, although recent, more favorable ocean conditions have slowed the apparent decline in particular in Admiralty Reach and Georgia Basin in the last two years. The largest changes were in Bellingham Bay, followed by a lesser degree in Central Basin, South Hood Canal, and Elliott Bay.

### Marine Water Condition Index Scores for 12 Regions of Puget Sound 1999-2012



**Figure 3.15.** Numbers greater than zero indicate improving water quality and numbers smaller than zero indicate decreasing water quality relative to the baseline (1999-2008). Green shades show improving water quality. Orange to red shades indicate declining conditions. Yellow shows scores between -1 and 1, representing little to no change.  
Source: Washington State Department of Ecology, Environmental Assessment Program, Marine Monitoring Unit

The largest driver of declining marine water quality has been increasing nitrate concentrations. This also affected the balance of nutrients in the system which can affect the marine food web at its base. Over the past 14 years, nitrate levels have increased steadily despite ocean variability. Because nitrate is an important plant nutrient, increasing nitrate loads can fuel algae blooms which, as the algae subsequently die and decay, can drive low dissolved oxygen events.

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**For more in-depth information,  
please see:**  
[www.psp.wa.gov/vitalsigns/marine\\_  
water\\_quality.php](http://www.psp.wa.gov/vitalsigns/marine_water_quality.php)

# Marine Water Quality

## Dissolved oxygen

### Progress Toward the 2020 Target

Keep dissolved oxygen levels from declining more than 0.2 milligrams per liter in any part of Puget Sound as a result of human input.



No Data

### Is There Progress Toward the 2020 Target?

The analysis of progress toward the 2020 target is pending due to ongoing studies that will determine whether human activities around Puget Sound are a significant source of nitrogen in marine waters.

However, information is emerging. A recent study<sup>1</sup> of Hood Canal indicated that human releases of nitrogen were unlikely to be contributing to low dissolved oxygen in the main arm of the Canal. The Pacific Ocean and circulation patterns influence low oxygen levels. The same study found that human inputs to Lynch

Cove in the southern part of Hood Canal, may be cause for concern. However, uncertainty is high and more detailed analyses are required to determine whether water quality standards are violated. Shoreline on-site sewage systems are the dominant human source to Lynch Cove, and current management practices that control bacteria are also effective at controlling nitrogen.

In southern Budd Inlet, the Department of Ecology has determined that the combination of human nutrient sources from point and nonpoint sources causes

dissolved oxygen levels to decline by more than 0.2 milligrams per liter. The presence of the Capitol Lake dam also causes dissolved oxygen to worsen by as much as 2 milligrams per liter. The Department of Ecology is currently working with stakeholders to develop a water cleanup plan for Budd Inlet, Capitol Lake, and the Deschutes River watershed.

Comprehensive studies to evaluate human contributions to low dissolved oxygen are underway in many parts of Puget Sound. Natural sources and processes such as limited circulation can produce low oxygen concentrations. Marine monitoring today includes measuring the effects of both natural and human processes. Scientists use computer models to tease apart whether and how much human nutrient sources worsen dissolved oxygen levels compared with natural conditions. The Puget Sound dissolved oxygen model evaluates the influence of human nutrient sources now through 2070 as well as climate impacts through 2070. To date, published studies have evaluated two regions of Puget Sound. The Department of Ecology will release draft results in fall 2013 for South Puget Sound and Puget Sound overall.

Additional studies will be required to refine current models and improve our understanding of the degree to which human inputs contribute to low dissolved oxygen problems in Puget Sound, and what management actions may be necessary to address them.

<sup>1</sup> Study on nitrogen releases to Hood Canal <https://fortress.wa.gov/ecy/publications/SummaryPages/1303016.html>



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**For more in-depth information,  
please see:**

[www.psp.wa.gov/vitalsigns/marine\\_water\\_quality.php](http://www.psp.wa.gov/vitalsigns/marine_water_quality.php)

photo opposite page credit: Duane Fagergren, Puget Sound Partnership

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